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BULLETIN
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On a Fossil Marine Diatomaceous Deposit from Atlantic City, N. J.—II.

BY C. HENRY KAIN and E. A. SCHULTZE.

Plates XCII. and XCIII.

(Continued from page 76.)

Since the publication of the first paper upon this deposit, the well from which the specimens were obtained has been sunk to a depth of over 1200 feet, so that the range of the diatomaceous strata can now be pretty well determined. The richest portions are at the depths, respectively, of 406, 550 and 625 feet. While all the strata contain many species in common, yet the stratum at 406 feet appears to be essentially different from the others in regard to the size and general character of species. At a depth of 625 feet a stratum about four feet in thickness occurs, in which the predominant forms are identical with those found at 550 feet. Below this, only a few scattered diatoms are found, until a depth of 677 feet is reached, when they disappear entirely. As these beds begin at a depth of 387 feet, it will therefore be seen that, including the sand beds which separate them, the series occupies a thickness of about 290 feet. It is interesting to note that, throughout the entire deposit, iron pyrites in minute crystals is abundant, and when specimens of the dry earth are placed under the microscope, the glittering crystals of pyrites are often very beautiful. Microscopists probably remember how great an interest was excited, a few years ago, by the announcement that diatoms had been discovered in the London clay, so coated with pyrites as to appear gold-plated. The circumstance was considered rather remarkable. In this deposit, the mineral appears in crystals rather than in the form of a smooth coating, and doubtless the partial disintegration of the valves that is sometimes noticed is due to the chemical action of the pyrites.

In addition to the list of species previously published, the following have been observed:

Anaulus birostratus, Grun. Very rare.

Aulacodiscus Solittianus, Norman.

BIDDULPHIA BRITTONIANA, Kain and Schultze, n. sp.

Valve oblong elliptical, terminating in apparently hollow, large processes, which originate a little to the side of the extremities and incline in opposite directions. From the base of each of these processes arise one, and sometimes two, semi-circular, awl-shaped spines. Along the margins and in the center the valve is partly covered with a fine, hair-like growth, intercepted by two longitudinal striated bands. (Plate XCII., Figs. 1, 1a, 1b, 1c).

The structure of this very curious species seems, at first, quite puzzling. The frustules appear to be formed of two valves united with their convex sides together and the concave sides outward—exactly contrary to received ideas as to the structure of a diatom frustule. After a careful study of broken shells, it will be seen that these apparent frustules are in reality valves of different frustules; that the hoops, being easily destroyed, have disappeared in the process of cleansing, but the setæ being more strongly siliceous, have withstood the treatment and held together the valves of different frustules.

In a specimen of *Stauroneis acuta*, kindly furnished by Prof. H. L. Smith, a similar phenomenon occurs. The hoops have disappeared during treatment, and valves of different frustules have united to form false frustules, in which the shells have their convex sides together, and their concave sides outward.

While the alternation of the sub-lateral processes indicates an alliance with Ehrenberg's genus, *Cerataulus*, we prefer to adopt the view of Professor Smith, who unites this genus with *Biddulphia*.

Figures 1, 1a and 1b are reduced from drawings kindly furnished by Rev. Francis Wolle.

Biddulphia longispina, Grun.

Biddulphia Weissflogii, Grun.

BIDDULPHIA ?? Kain and Schultze, n. sp.

Valve broadly elliptical; punctæ irregular; surface broken by numerous free bands ramifying from the center; two slight elevations at each extremity. (Plate XCIII., Fig. 4).

While this curious form lacks the processes which belong to the genus *Biddulphia*, it seems more closely allied to this than to

any other genus. A somewhat similar form occurs in the fossil deposit at Ananino, Russia.

Cestodiscus ovalis, Grev.

For the recording of this species we are indebted to Dr. D. B. Ward, of Poughkeepsie.

Chaetoceros (didymus), Ehr. (?) (Plate XCII., Fig. 6).

Cyclotella operculata, Kütz.

Discoplea physoplea, Ehr.

Epithemia gibba (Ehr.), Kütz. Rare.

EUNOTIA AMERICANA, Kain and Schultze, n. sp.

Valve arcuate; dorsal ridge convex and constricted into broadly rounded ends. Striation exceptionally fine. (Plate XCIII., Fig. 1).

Eupodiscus radiatus, Bailey, var. *antiqua*, J. D. Cox.

While this species bears a general resemblance to *Eupodiscus radiatus*, the cellules are not radiate nor of equal size, but are much smaller towards the margin. General Cox has noted the same form in the Richmond deposits, and instead of considering it a distinct species, he prefers to consider it merely a variety.

Hemiaulus affinis, Grun.

Grammatophora serpentina, Ehr. var. (Plate XCII, Figs. 5 and 5a).

Hyalodiscus laevis, Ehr.

Liradiscus minutus, Grev.

We are indebted to Dr. Ward for a beautiful photograph of this species found in the deposit.

NAVICULA DE WITTIANA, Kain and Schultze, n. sp.

Valve broadly lanceolate; median line stout; striae costate, convergent at the middle of the valve and radiate towards the apices; intermediate free space broad. (Plate XCIII., Fig. 5).

Navicula Lewisiana, Grev.

Navicula Lyra, Ehr.

The type form and several varieties are frequent.

Navicula (Pinnularia) macilenta, Ehr. Rare.

Plagiogramma Gregorianum, Grev.

Rhaphoneis gemmifera, Ehr.

Sceptroneis gemmata, Grun.

Stictodiscus Kittonianus, Grev.

Terpsinoe intermedia, Grun. var. (Plate XCIII., Figs. 2 and 2a).

Triceratium Ehrenbergii, Grun. (*Discoplea undulata*, Ehr.)

TRICERATIUM HEILPRINIANUM, Kain and Schultze, n. sp.

Valve triangular; surface with central and angular elevations—the central elevation shaped like a truncated pyramid; punctæ radiate and coarser at center. (Plate XCIII. Figs. 3 and 3a).

We take pleasure in dedicating this beautiful form to Prof. Angelo Heilprin, the distinguished naturalist.

TRICERATIUM INDENTATUM, Kain and Schultze, n. sp.

Valve triangular with convex margins; extremities slightly constricted and double, produced by rounded indentations; cellules stout, radiating from center. (Plate XCII., Fig. 4)

Triceratium Kainii, var. CONSTRICTUM, Schultze, n. var.

Valve triangular, with deeply constricted margins; striation moniliform, convergent toward the center and intercepted by three costæ equi-distant between the produced apices and the unstriated center. (Plate XCII., Fig. 3).

Tryblionella Hantzschiana, Grun.

Tryblionella scutellum, W. Sm.

DESCRIPTION OF PLATES.

PLATE LXXXIX.

Fig. 1, 1a, 1b.—*Dimeregramma Novæ-Cesarææ*, K. and S.

Fig. 2.—*Navicula Schultzei*, K.

Fig. 3.—*Biddulphia Woolmanii*, K. and S.

Fig. 4.—*Biddulphia Cookiana*, K. and S.

Fig. 5.—*Triceratium Kainii*, S.

Fig. 6, 6a.—*Triceratium semicirculare*, Brightw.

Fig. 7.—*Rhabdonema Atlanticum*, K. and S.

PLATE XCII.

Fig. 1, 1a, 1b, 1c.—*Biddulphia Brittoniana*, K. and S.

Fig. 2.—*Auliscus Spinosus*, Christian. Reduced from Schmidt's Atlas der Diatomaceen-kunde, Plate CXXV., Fig 2.

Fig. 3.—*Triceratium Kainii*, var. *constrictum*, S.

Fig. 4.—*Triceratium indentatum*, K. and S.

Fig. 5a.—*Grammatophora serpentina*, var., K. and S.

Fig. 6.—*Chaetoceros (didymus)*, Ehr. ?

Fig. 7.—*Actinodiscus Atlanticus*, K. and S.

PLATE XCIII.

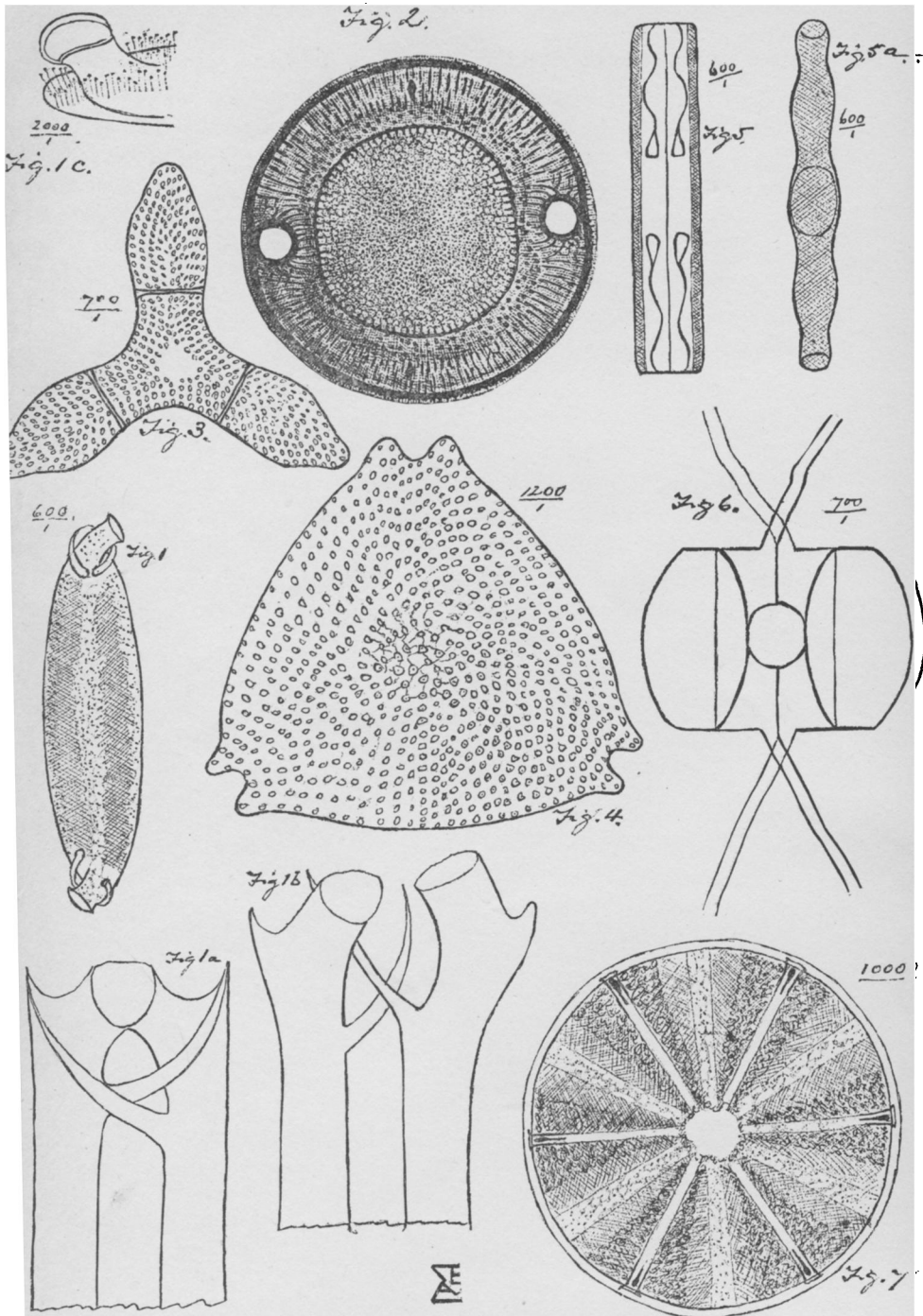
Fig. 1.—*Eunotia Americana*, K. and S.

Fig. 2, 2a.—*Terpsinoë intermedia*, Grun, var.

Fig. 3, 3a.—*Triceratium Heilprinianum*, K. and S.

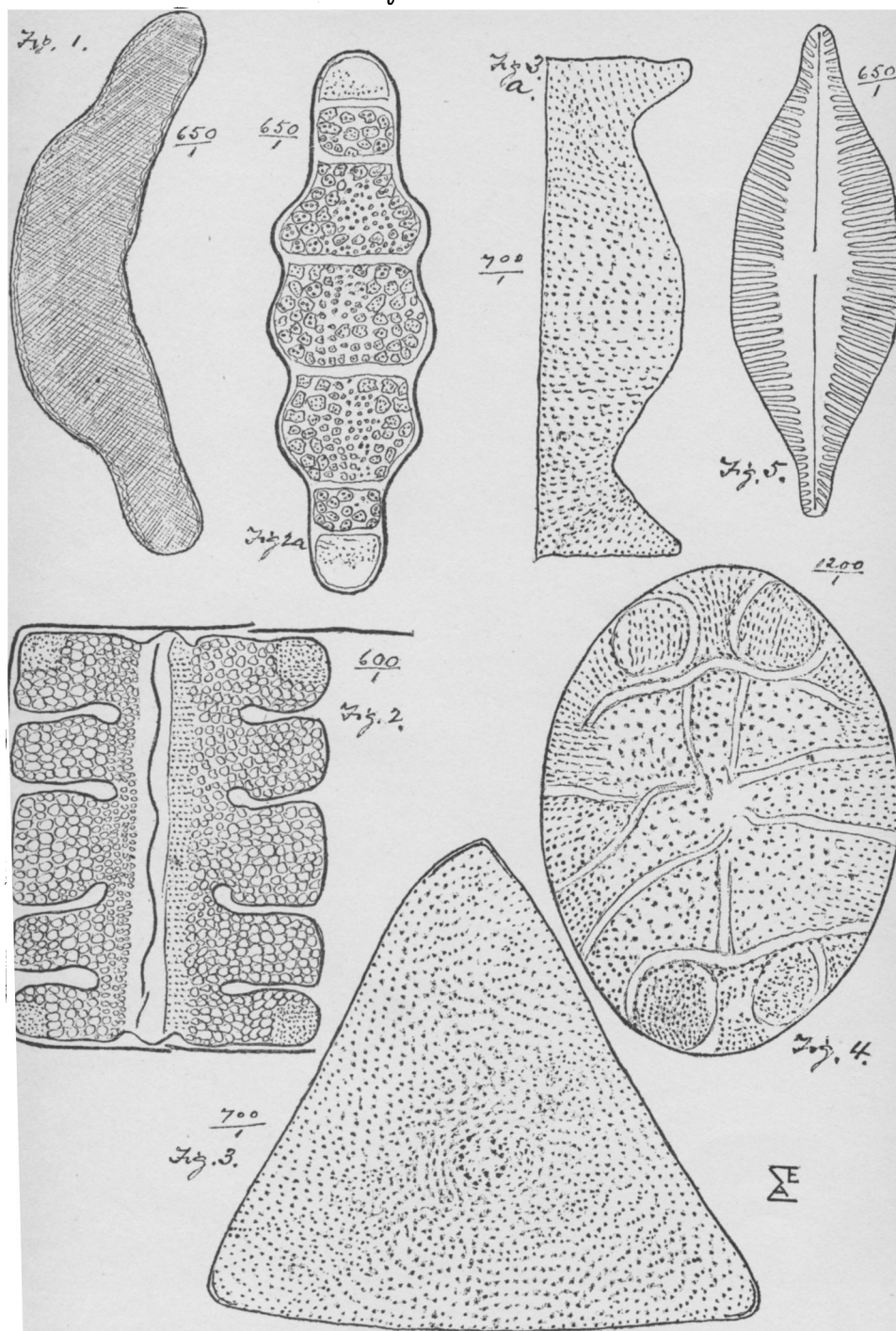
Fig. 4.—*Biddulphia*? K. and S.

Fig. 6.—*Navicula De Wittiana*, K. and S.



Diatoms from Atlantic City, N. J.

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